Entire 6 GHz Band Critical for Wireless Broadband

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Broadband Investments based on Backhaul + Wireless

Connected Devices
- Wi-Fi

Customer Premise
- DSL CPE
- PON CPE (ONU/GW)

Service Provider
- DSL
- PON
- P2P Ethernet
- DSLAM
- PON OLT
Broadband Trends

AT&T delivers fiber with up to 5-Gigs of Speed
January 24, 2022

Canadian Operators (Bell & Rogers) Offer 8-Gig speeds
August 4, 2022

1 Gbps

2000

100 Mbps

2014

1 Gbps

2018

10 Gbps

Wireless needs to keep up

2024
6 GHz Wi-Fi *Perfect* Complement to Broadband

6 GHz Wi-Fi is specially designed for gigabit broadband and immersive wireless applications

- Three non-overlapping 320 MHz channels
- Seven non-overlapping 160 MHz channels
- Fourteen non-overlapping 80 MHz channels

Countries that only enable 500 MHz will have degraded performance for their citizens and industry.
Wi-Fi 6E devices operating in their widest capable bandwidth are the most power efficient and capable of operating at the lowest latency

Meta says Quest Pro includes a full Wi-Fi 6E experience in the 6 GHz broadband spectrum, and can deliver up to 1.6Gbps of throughput, which is notably double the bandwidth over Quest 2 Wi-Fi capabilities.

The new iPad Pro supports the fastest Wi-Fi connections with support for Wi-Fi 6E, so users who need fast connections can take their demanding workflows with them everywhere. Downloads are up to 2.4Gb/s, 2x faster than the previous generation.
Markets that only designate 500 MHz will have insufficient capacity to deliver gigabit+ broadband wirelessly

With three channels, there is typically enough spatial separation between each residential network where the amount of same channel interference is limited

- In dense urban corridors 4 or even 5 channels could be required to avoid significant overlapping networks on same channel

<table>
<thead>
<tr>
<th>Spectrum Availability</th>
<th>Bandwidth</th>
<th>1 Spatial Stream</th>
<th>2 Spatial Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 MHz</td>
<td>Maximum 320 MHz</td>
<td>2.5 Gb/s</td>
<td>5 Gb/s</td>
</tr>
<tr>
<td>500 MHz (480 MHz)</td>
<td>Maximum 160 MHz</td>
<td>1.2 Gb/s</td>
<td>2.4 Gb/s</td>
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</tbody>
</table>

- French Operators announcing 2 Gb/s
- US Operators announcing 5 Gb/s
- Canadian Operators announcing 8 Gb/s

*Note: Client devices typically have only one or two antennas, which will limit the overall capability of the network.
Markets that only designate 500 MHz will have ¼ of the capacity for typical carpeted enterprise

Typical carpeted enterprise configurations require a minimum of seven channels to avoid co-channel interference

- With 1200 MHz you can enable 160 MHz channels
- With 500 MHz you can only enable 40 MHz channel

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<th>2SS</th>
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<tr>
<td>1200 MHz</td>
<td>Maximum 160 MHz</td>
<td>1.2 Gb/s</td>
<td>2.4 Gb/s</td>
</tr>
<tr>
<td>500 MHz (480 MHz)</td>
<td>Maximum 40 MHz</td>
<td>286 Mb/s</td>
<td>573 Mb/s</td>
</tr>
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- This will create asymmetric communications capabilities for industries that are located in countries that have opened up the entire 6 GHz band
  - Note, enterprise is rapidly adopting Wi-Fi 6E, so these asymmetries are playing out in the market right now
  - This will significantly impact research institutions, schools, hospitals
Markets that only designate 500 MHz will have ¼ of the capacity for dense stadium deployments

Typical stadium deployment requires a minimum of 14 channels to avoid co-channel interference

- With 1200 MHz you can enable 80 MHz channels
- With 500 MHz you can only enable 20 MHz channel

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- Events in venues that are located in countries that do not designate the whole band will have serious competitive disadvantage in providing next generation fan experiences
“Wi-Fi Scores 100X Data Increase at the Super Bowl over 10 Years for 20X Less Money than 5G”

Continued trajectory requires more spectrum

*Super Bowl Wi-Fi data compiled by Extreme Networks

Super Bowl LV at Raymond James Stadium in 2021 saw 13.97 TB of Wi-Fi used with reduced attendance due to Covid pandemic
Why the full 6 GHz band?

- Equipment on the market is already designed to operate over the entire band.
- Enterprises and dense urban environments require more channels to work effectively.
- Citizens in countries that have allocated the full band will have a superior wireless broadband experience.
- This will realize benefit of broadband investment.
- Alternatives are speculative.
Select Announcements
Wi-Fi 6E enables research collaboration at the University of Michigan

The more than 16,000 Wi-Fi 6E wireless access points make it easier for researchers...to collaborate with peers across campus, moving around and analyzing large amounts of data.

We want to...build a transformational network that allows our researchers to do the work they need to do, to move the information at the highest possible speeds that they can, to provide to them ubiquitous bandwidth.

Ravi Pendse
Chief Information Officer
Wi-Fi 6E enables next generation healthcare and services

Wi-Fi 6E brings 1200 MHz of interference-free spectrum that will enable advanced healthcare deployment scenarios.

Our mission-critical, Wi-Fi-enabled care equipment will now have its own clean airspace to ensure the delivery of revolutionary new services.

This opens the door.. to dream big when it comes to the innovation in mobile care.

Wi-Fi 6E is the catalyst that will enable our vision of next-generation healthcare and patient experiences.

Allen Rider
Chief Wireless Network Architect
Wi-Fi 6E* enables proliferation of digital services and operational efficiencies for stadiums

With Extreme Networks’ Wi-Fi 6E and analytics, Liverpool FC will gain real-time data to Anfield Stadium, which houses 54,000 fans.

These insights will empower the club to make data-driven decisions, deliver more personalised fan experiences and improve operational efficiencies on match day.

* Outdoor is not authorized in UK, so outdoor is 5 GHz Wi-Fi 6; and indoor deployments can be Wi-Fi 6E
Golden State Warriors and Chase Center Elevate Immersive Fan Experiences with Aruba Wi-Fi 6E

“The Warriors are obsessed with creating world class experiences, and providing fast, reliable connectivity for sold out crowds of 18,000+ fans at games and events at Chase Center is an incredibly important part of that,” said Warriors President and Chief Operating Officer, Brandon Schneider.

“With the addition of Wi-Fi 6E Access Points in the arena bowl, we can provide fans a more immersive experience that we believe is unmatched by any other professional sporting venue.”
Wi-Fi 6E enables innovation in carpeted enterprise

LG Electronics tapped Extreme Networks to upgrade its end-to-end network at LG’s headquarters in the Republic of Korea.

With next generation Wi-Fi 6E and easy-to-deploy Fabric and Universal switching solutions, LG unlocked:

- Next-generation connectivity for all employees and users
- A Future-proofed network for further upgrades and expansions